

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
12 February 2004 (12.02.2004)

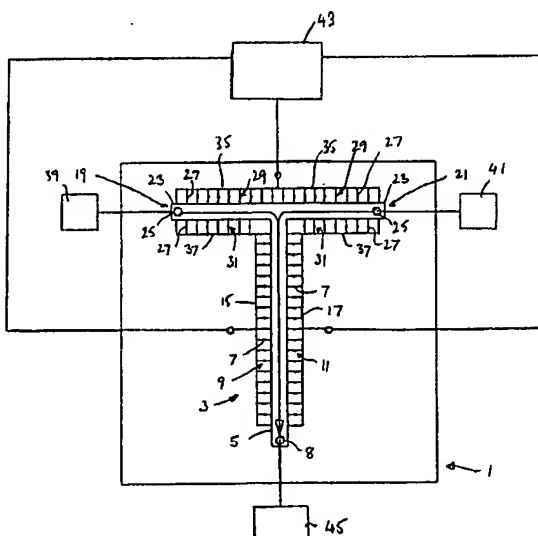
PCT

(10) International Publication Number
WO 2004/012852 A1

- (51) International Patent Classification⁷: B01F 13/00, 5/04, 3/18, 13/02
- (21) International Application Number: PCT/GB2003/003365
- (22) International Filing Date: 1 August 2003 (01.08.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 0217993.5 2 August 2002 (02.08.2002) GB
- (71) Applicant (for all designated States except US): IMPERIAL COLLEGE INNOVATIONS LIMITED [GB/GB]; Sherfield Building, Exhibition Road, London SW7 2AZ (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): MANZ, Andreas [CH/GB]; Department of Chemistry, Imperial College London, South Kensington, London, SW7 2AZ (GB). VILKNER, Torsten [DE/GB]; Department of Chemistry, Imperial College London, South Kensington, London, SW7 2AZ (GB).
- (74) Agent: BODEN, Keith, McMurray; Fry Heath & Spence LLP, The Gables, Massetts Road, Horley, Surrey RH6 7DQ (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

(54) Title: POWDER MIXING MICROCHIP, SYSTEM AND METHOD



(57) Abstract: A powder mixing microchip for mixing powder components, a powder mixing system incorporating the same and a powder mixing method for mixing powder components, the powder mixing microchip comprising: a powder mixing unit (1) for mixing a plurality of powder components to provide a powder mixture, the powder mixing unit including a powder mixing (5) channel in which powder components are mixed on being transported there through, a powder outlet port (8) through which the powder mixture is delivered, and a plurality of mixing gas supply channels (7) fluidly connected to the powder mixing channel at spaced locations along a length thereof through which mixing gas flows are delivered to effect mixing of the powder components on being transported through the powder mixing channel.

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB 03/03365

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B01F13/00 B01F5/04 B01F3/18 B01F13/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B01F B01J B01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 925 827 A (USBI CO) 30 June 1999 (1999-06-30)	1,2,5-7, 17-19, 21,32, 35, 38-41, 44-48,52
A	column 1, line 3 - line 6 column 1, line 26 - line 51 column 3, line 29 - line 38 figures 1,6	3,4, 8-16,20, 22-31, 33,34, 36,37, 42,43, 49,53-71
	---	-/--

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

28 October 2003

Date of mailing of the international search report

05/11/2003

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl
Fax: (+31-70) 340-3016

Authorized officer

Real Cabrera, R

INTERNATIONAL SEARCH REPORT

Internati plication No
PCT/GB 03/03365

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 474 477 A (SMITH WILLIAM H ET AL) 2 October 1984 (1984-10-02)	1,2,5-7, 17-19, 21,32, 35, 38-41, 44-48,52
A	column 1, line 6 - line 16 column 1, line 34 - line 64 figure 1	3,4, 8-16,20, 22-31, 33,34, 36,37, 42,43, 49,53-71
X	--- PATENT ABSTRACTS OF JAPAN vol. 2000, no. 16, 8 May 2001 (2001-05-08) & JP 2001 018206 A (MITSUI CHEMICALS INC), 23 January 2001 (2001-01-23)	1,2,5-8, 17-19, 38-48
A	abstract	3,4, 10-16, 20-37, 49-71
X	--- GB 2 096 911 A (SIMPKINS DAVID ROGERS PRICE) 27 October 1982 (1982-10-27)	1,3-7, 17-19, 22,23, 38-47
A	page 2, line 20 - line 57 page 3, line 100 - line 106 figures 1,3,8	2,8-16, 20,21, 24-37, 48-71
L	--- BERTSCH A ET AL: "3D micromixers - downscaling large scale industrial static mixers" PROCEEDINGS OF THE IEEE 14TH. ANNUAL INTERNATIONAL CONFERENCE ON MICROELECTRO MECHANICAL SYSTEMS. MEMS 2001. INTERLAKEN, SWITZERLAND, JAN. 21 - 25, 2001, IEEE INTERNATIONAL MICRO ELECTRO MECHANICAL SYSTEMS CONFERENCE, NEW YORK, NY: IEEE, US, vol. CONF. 14, 21 January 2001 (2001-01-21), pages 507-510, XP010534659 ISBN: 0-7803-5998-4 -----	1-71

INTERNATIONAL SEARCH REPORT

In relation to patent family members

International application No

PCT/GB 03/03365

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0925827	A	30-06-1999	US 6074085 A DE 69813483 D1 EP 0925827 A2 JP 11253774 A	13-06-2000 22-05-2003 30-06-1999 21-09-1999
US 4474477	A	02-10-1984	CA 1191509 A1 GB 2141942 A ,B	06-08-1985 09-01-1985
JP 2001018206	A	23-01-2001	NONE	
GB 2096911	A	27-10-1982	CA 1180734 A1 ZA 8202719 A	08-01-1985 25-05-1983